KENYATTA UNIVERSITY

UNIVERSITY EXAMINATIONS 2014/2015

DIGITAL SCHOOL OF VIRTUAL AND OPEN LEARNING

SECOND SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF PUBLIC POLICY AND ADMINISTRATION

APP 102: QUANTITATIVE TECHNIQUES

DATE: SATURDAY 2ND MAY 2015 **TIME: 4.30 P.M. – 6.30 P.M.**

INSTRUCTIONS:

Answer question ONE and any other 2 questions

QUESTION ONE: (30 Marks)

a) A sample of 200 voters revealed the following information about the three candidates A, B and C who are running for Chairman, secretary and treasurer respectively. 28 were in favour of both A and B. 98 in favour of A or B but not C. 42 in favour of B but not C or A. 122 in favour of B or C but not A. 64 in favour of C but not A or B. 14 in favour of A and C but not B. Determine the percentage of voters who were in favour of the three candidates. (5 Marks)

b) Given that the total cost of producing a certain commodity is $TC = 80 + 0.04Q + 0.002Q^2$, determine the production level that minimizes Average Total Cost (ATC) and the minimum ATC. (10 Marks)

c) Find the dimensions of a rectangle with a perimeter of 54 metres, if its length is 3 metres less than twice its width. (5 Marks)

d) Demand for goods of an industry is given by pq = 100 while the supply curve is given by 20 + 3p = q. what is the equilibrium price and quantity? (5 Marks)

e) The function describing the marginal cost of producing a product is $MC = x + 100$ Where x equals the number of units produced .It is also known that total cost equals Sh. 40,000 when $x = 100$. Determine the total cost function. (5 Marks)

QUESTION TWO (20 Marks)

(a) A movie theatre charges Sh. 80 for each adult admission and Sh. 50 for each child. One Saturday, 525 tickets were sold, bringing in a total of 32,550. How many of each type of ticket were sold? (5 Marks)

(b) The weights, in kilogrammes, of 100 pieces of iron were listed in the following classes.

Class	Frequency
110-119	21
120-129	31
130-139	33
140-149	12
150-159	3

Find the mean weight of the iron, the standard deviation and the Covariance. Comment on each of the answers (10 Marks)

(c) Explain the term dispersion. What purpose does a measure of dispersion serve? (5 Marks)

QUESTION THREE (20 Marks)

a) The research department in a company that manufactures AM / FM clock watches established the following price-demand cost and revenue functions

$$P(x) = 50 - 1.25x \qquad R(x) = xP(x) = x(50 - 1.25x) \qquad C(x) = 160 + 10x$$

Where x is in thousands of units and $C(x)$ and $R(x)$ are in thousands of shillings. All the three functions have a domain $1 \le x \le 40$. Determine algebraically:-

i. the breakeven point
ii. the maximum revenue to the nearest thousand shilling
iii. the output to the nearest unit that produces the maximum revenue
iv. What is the wholesale price of the radio to the nearest shilling at this output?

(15 Marks)

b) Given

$$F(X, Y) = X^2Y + 3XY + Y^2,$$

Find F_x and F_y at the point (2, 1) (5 marks)

QUESTION FOUR (20 Marks)

(a) A firm has analyzed its operating conditions and has developed the following functions

$$\text{Total Revenue} = -10q^2 + 200q$$

$$\text{Total Cost} = q^2 - 20q + 1000$$

Where q is the number of units produced and sold.

Determine the value of q that:-

i. Maximizes revenue and hence the Maximum Revenue
ii. Minimizes Cost and hence the Minimum Cost
iii. Maximizes profit and hence the Maximum Profit.

(10 Marks)

(b) A manufacturer has found that if he wants to increase his output, he must lower his price. His total revenue (TR) from an output x, is given by the expression $TR = x(148 - x)$. His production costs are Shs. 1,000 fixed and Shs. 36 per unit variable. Required:

Find:

(a) The output that would maximize revenue.
(b) The maximum total revenue.
(c) The profit P in terms of the number of units (x).
(d) The output x, that would maximize profit.

(10 Marks)

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